Jan/Feb 1981

$2.50

SS-50 Computing

for 6800 and 6809 users

6809 DISK SYSTEMS

All disk systems are supplied with our version of FLEX 9, the world standard disk operating system for the 6809. Our systems normally operate in double density format, but they are compatible with single density, or single sided recording formats. FLEX is supplied with over forty utilities, many of which are only available with our systems.

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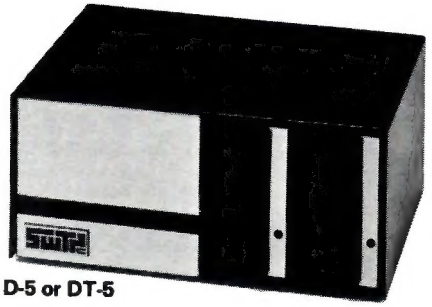
TYPE	CAPACITY	COST
D-5	720,000 bytes	$1.80 per/K
DT-5	1,400,000 bytes	$1.16 per/K
DMF-2	2,400,000 bytes	$1.04 per/K
CDS-1	16,000,000 bytes	$ .27 per/K

D-5 Two double sided, double density, 5" disk drives with a total on line capacity of 720,000 bytes of data. Includes cabinet, power supply, connecting cable and controller. Controller will operate up to four drives. This is an ideal disk system for small stand alone word processing systems, or for businesses that do not work with large inventories.

14 x 6 x 10 — 20 lbs $1,295.00



D-5 or DT-5

DT-5 Double track density version of the D-5. The DT-5 uses two 96 track per inch drives to provide an on line capacity of 1,400,000 bytes. Includes cabinet, power supply, connecting cable and controller. Controller will operate up to four drives. This is a disk system with enough capacity to include small inventories of up to 1,000 items, plus the usual business package of general ledger payroll, etc.

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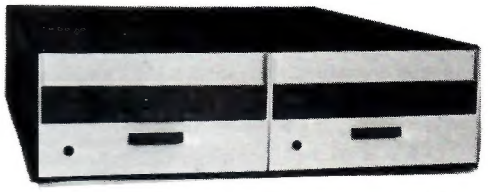

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DMF-2 Double sided, double density, dual eight-inch disk system with an on line capacity of 2,400,000 bytes. Our "top of the line" disk system features a DMA type controller for fastest possible data transfers. This drive was designed for larger businesses and multi user installations. The DMF-2 will provide the fast operation necessary for systems running multiterminals under the UniFLEX operating system. Complete with a heavy duty 1/8-inch metal cabinet, power supply, connecting cable and controller. The controller will operate up to four drives.

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CDS-1

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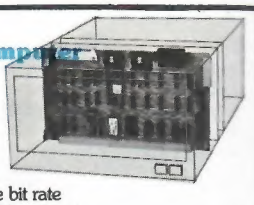

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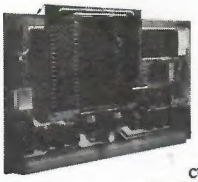

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Upgrades 6800 MPU cards to 6809 processing power ● Configured for SWTP MP-A2 MPU card but may be used with other MPUs ● Plug-in installation requires no trace cutting or soldering — easy to restore MPU to original configuration ● Assembled and tested ● Includes user instructions ● 6809 ROM operating system, PSYMON/A2, for use with the 6809 MPU Adapter — $69.95.

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Memory-mapped instant display updating ● Software-defined display formats ● Expandable 128-symbol character generator — characters are fully formed and feature true baseline descenders ● On-card display RAM can be remapped ● Video output can be composite or separate sync-video ● Voltage regulation circuitry included on card. For an application review of the ELECTRIC WINDOW, see Peter Stark's comments on page 87 of the January 1981 issue of Kilobaud/MICROCOMPUTING.

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Memory is organized as three independent 8-Kbyte blocks. Each block may be located at any 8-Kbyte boundary of a 64-Kbyte address space ● Also available in 8- and 16-Kbyte versions at regular prices. 8-Kbyte RAM expansion kit includes **extra** RAM chip, plus sockets and other parts. Kit price is $139.95. ● Uses 2114L RAM chip.

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  - ☆ 40 track or 35 track density on double sided 5¼" drives.
  - ☆ User can select the system boot configuration.
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- Can read and write a single sector by itself. On-board buffer memory allows full interrupt capability in interrupt driven systems. Once data transfer has been initiated, no more processor time is required.
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- Track Ø of side Ø is recorded in single density per IBM standard.
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All of these features are available for immediate delivery on one standard 5½" x 9" 50 pin SS–50/SS–50C card for only $449.00. The price includes DOS68D version 5.1, MONITOR object code on diskette, and a manual with the source listing.

SCB-69
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The most versatile 6809 CPU Board on the market is now available from Smoke Signal Broadcasting and has the following features:

- Standard 2 MHz operation. (Shipping 1.5 MHz until August 80)
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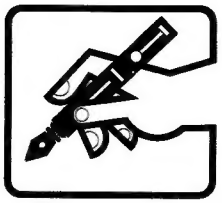


Editorial

by Ken Orme

I recently received a letter which asked some questions that we could all take some time to think about. The writer was interested in purchasing a system and is considering a 6809 system. He further stated that he was interested in word processing and small business applications, in addition to the other personal computing that most of us enjoy. However, he stated that he was concerned about getting an SS-50 bus system because he hadn't seen very many ads for various systems and he didn't want to get stuck with something that wouldn't do what he wanted, or wouldn't get support. He also mentioned that he would like to know the advantages of the SS-50 bus and/or the 6809 so that he could compare the features.

In answering him, I explained that with the 6809, there are no barriers as far as application programs or word processing. The one thing we have to admit as SS-50 bus users is that we can't answer the same for the 6800. I suppose with the 6800 not being sold by SWTPc any more, that we are inclined to feel that it is a lost cause to write new programs for it. However, most of the things that are available on the 6809 can be re-written to run on the 6800 as well. If some of the software people will continue to support the 6800, it, too, will have no barriers in the small business areas.

As far as systems and perpherials are concerned, the SS-50 bus systems are as cost-effective as the others, and many, many are more cost-effective. You still get what you pay for. If you need or want dual density or quad density, it is available. If you want disks built-in the mainframe or separate, you can get them. If you want a Winchester hard-disk system, it's available. For those that don't want to or can't afford to buy a disk system, many different tape systems are still available. Video boards are also prevalent and you have a choice of several different manufacturers. Modems may be interfaced as well as many different printers. Even computer portraits and other such applications may be done with the SS-50 bus systems. Time-sharing, real-time applications and many other processes are all available for those that desire them.

Software is coming along well, since we are able to purchase word processing, PASCAL, FORTRAN, Accounts Receivable, Accounts Payable, General Ledger, Inventory, Payroll, Check Ledger, and many other types of application software. System software has also increased and some of it is much better than you can find on any other micro system.

The advantages of one system verses another are not truly know by the people using the system. They just happen to get used to the system they are working with, and therefore don't know the good and the bad compared with other systems. I have worked with several different systems and BASICS, three of which are on the SS-50 bus. Out of all the systems it seems to me that those on the SS-50 bus are the easiest to work with and learn. That may be from the fact that the SS-50 system was the first one I learned, but from a learning standpoint, it still seems the easiest to learn for most people.

That is perhaps the main reason a lot of hobbyists and experimenters are purchasing 6800 and 6809 systems. Interfacing is quite easy, and costs aren't as expensive as with most of the other buses.

Many of the things that a person wants, software-wise, will have to be generated by themselves or others doing similar things. Very seldom do you purchase an application package that fits your immediate needs, the needs you will have in a year *and* the needs you will have in five years. Our needs are usually changing and therefore the software will need some changes, too. We should know enough about our system, BASIC (or other language used) and the peripherals used to make the changes that are

necessary. Therefore, as an owner/-operator of a system, I feel we should get one that we can understand enough to do the above.

At the same time, we need to have a system that may be changed to suit various peripherials and devices and one that may expand as we need to improve it.

There are several other factors you should consider, depending on what you are going to do with the system. If you are doing a lot of small-business applications, you should *not* limit yourself to the 40 column-screen "all-in-one" machines, since 80 columns is almost a necessity for that use. Multi-user capability is sometimes a consideration for educational and business applications.

I feel that any of the things that can be used with the S-100 bus that aren't used on the SS-50 bus right now, can be applied to the SS-50 bus with a little desire from our group.

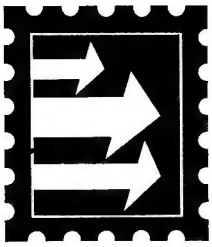
We don't have anything to make us feel like we are holding the short end of the stick. Just the opposite.

[*SS-50*]

Beginning with this issue, we will be including the **Perpherial** newsletter from Percom Data Company. Although this part of the magazine is a "paid portion", it has a lot to offer. There are several ideas given that should help the hobbyist and experimenter. News of upcoming products and other features will be included. It will be a complete newsletter inside our magazine.

One of the major reasons for this addition is that we hope to be of benefit to all groups using the various machines and peripherals available. While it is physically impossible to be able to cover everything for everyone, we hope that this will at least help get closer to reaching our goal.

Many readers have asked about back issues again. We found a few more when we moved out of the other office. So far we still have a few of No. 1 through No. 4 which we sell for $3.00 each, postpaid (to U.S.A.). Foreign orders should include $1.65 (U.S.) for air postage for each issue. There are not many left, so first come, first served.



Letters

Dear Editor,

Thanks for your kind words in your Sept-Oct. issue about DYNAMITE, our 6809/6800 disassembler/source generator. We now have about a hundred copies of DYNAMITE all over the world, and users do seem to be very pleased with this product.

Let me just comment on the second-last paragraph of your article, in which you discuss disk-file size. The size of DYNAMITE's output file is generally about 3 times that of the input file containing the object code to be "DYNAMITED". Of course, this ratio depends heavily upon the exact nature of the code being disassembled. But for typical 6800 and 6809 software the ratio 1:3 is quite close.

The largest 6800 or 6809 object code program of which I am currently aware is TSC's excellent EXTENDED BASIC interpreter, which fills 78 blocks of disk. DYNAMITE will convert this into roughly 300 blocks, which will fit on even the smallest minifloppy (35 tracks, single-side, single-density) if you start with a clean working disk.

H. Joseph Turner, Jr.
President, Computer Systems Center
Chesterfield, Missouri

I appreciate the report on the code ratio for DYNAMITE. What I intended to convey by the paragraph on size is that if a person were going to disassemble a large file and then work on it with the editor, there would not be room on one disk for both the text file and the backup. This is not a problem with DYNAMITE any more than with any other large text file on a small disk. Ed.

BOAZ D64KB Dynamic Memory Board

With the advent of the 6809 and its ability to address up to 1024K of memory, it was quickly apparent to most of us that if extended addressing was to be used, we needed to have large capacity memory boards and low power consumption. In addition, inexpensive memory would be nice, but it has been the exception rather than the rule. Many SS-50 users have seen memory prices for the TRS-80, Apple and PET steadily decrease, but there were no dynamic boards around that used the 4116.

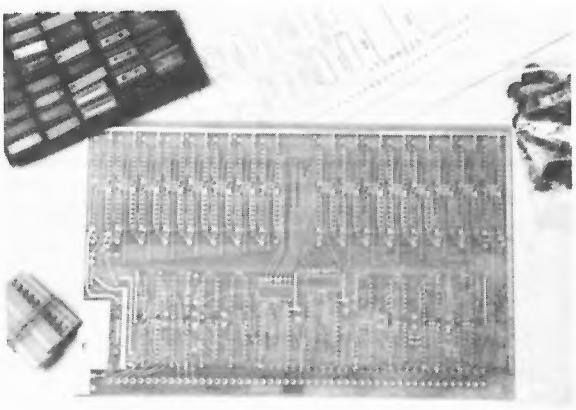
Well BOAZ Co. did something about it. They have made available their D64KB, a 64K dynamic memory board which will work with both the 6800 (SS-50) bus and the 6809 (SS-50C) bus. It features the 4116 memory chips which are getting more reasonable in price every day. It uses transparent refresh and also is compatible with the 20 bit extended addressing mode. Power consumption is very low with the full 64K requiring only .5 Amps at 5 Volts. Other power requirements are 12 volts at .150 Amps., and -5 volts at .007 Amps. The 9 x 5.8 inch board is a real space save, since for most systems all you need to do is add a CPU board and you will fill the system with only two 50 pin boards.

The D64KB comes in kit form, the P. C. board alone less memory or completely assembled and tested.

The board is a high quality, double-sided epoxy design with plated through holes, silkscreened component layout and a solder mask on the bottom. The parts that we received were also of good quality and only one capacitor was missing out of all the parts. The 18 page instruction manual is quite complete and consists of three major parts; the building instructions, the section on theory of operation including timing charts, and the parts location diagrams.

As with any new product, there is a page with corrections on it, which will be taken care of with the next printing. The instructions are written much like those found in the leading 6809 Computer kit. The first three instruction words are: "Install all resistors." The best part is that there are only three resistors that go directly on the board. However, we point this out to so that you realize the color code and basic building knowledge is necessary. Unlike some of the manuals that we have seen, this one elaborates the important points and explains in detail when necessary. But there are

two points we found to be a slight problem. One problem was the tantalum capacitor marking. The "normal" tantalum has the polarity marked with a plus sign. However, the ones we received did not. There was a dot in the center of the capacitor to help polarize them, but we feel an explanation or drawing in the manual would help a lot. The other problem came after completion of the board. It took quite a bit of searching to find out



about the selector jumpers (or switches) used to address the board. Also, the information about a jumper to install when *no* extended addressing is used was in the "theory" section instead of a section on testing or setting up the board. In fact, our suggestion is to have a section of setting up and addressing the board which is separate from the theory part. This allows you to find the information much faster. Everything that we could determine indicated that the addressing is for 32K and above only. With all the switches off, S-BUG said "32K" and incremented by 4K with each switch selected.

All construction went very quickly with about three hours spent in reading and building. Most of the resistors are mounted in component carriers which speeds up construction. The only hangup we had was a diode with leads about twice the size of the holes in the P.C. board. A small bit was available, so we just opened up the holes and soldered the diode on both sides. The corrections mentioned to set the diode on top to solder it. It also mentioned that care must be taken when soldering a board populated with as many ICs as found on the D64KB. The holes for some of the capacitors are quite close to the memory chips and can be filled with solder when installing one part or the other. Sockets are recommended and are included with the kit that we ordered. All of our staff feels that the sockets are worth the cost, especially when using CMOS chips.

The instructions from BOAZ tell you to check voltages before installing the ICs. A very good point which is very important. After we found the voltages to be what they should, we inserted all the TTL chips. The CMOS circuits were then inserted following normal precautions. We first installed 16K to give it the "smoke test". Then having passed it okay, we put in the remainder of the memory. It worked like a charm! After running the memory test on it for two hours, we felt it was performing fine.

Aside from the addressing information problems, the manual is quite complete in the theory of operation. It gives a complete circuit diagram, a partial memory diagram, component carriers, outline diagram, and two timing diagrams. Also a specification sheet and parts list is included.

Since this board could logically be the only memory in the whole system, BOAZ has a jumper which allows you to switch the upper 32K with the lower 32K. Thus if a bad chip occurs in the area required by the monitor, you will be able to isolate it easier.

BOAZ offers this fine board in many kit options and a wired version, all less memory. That way you can take advantage of all the latest prices on 4116s. At the time of writing, there are several companies offering them for $3.50 each in quantity one and some as low as $3.00---that means your memory

continued on page 28

STYLOGRAPH WORD PROCESSOR

By Ken Orme

From SONEX Systems comes one of the best reasons to own a micro...A word processor called STYLOGRAPH. Besides the many features that I will get to shortly, this word processor has instructions that are easy to learn and can have you running with it in a very short time. In fact, one of the best ways to learn how to run it is just to "jump in with both feet" and try it. I feel that it is the only way.

Since I am writing this with the use of the system, you will notice a difference in print style and quality, but the ease by which the text may be edited and changed is really nice. It beats many commercial typesetters and is at least equal to most.

One of the first things that I noticed when reading through the manual was the ability to make **boldface** type and to do underlining, since these are the features that distinguish a good word processor from a text editor. In addition to these, Stylograph also has the overlining, superscript, and subscript features.

Trying out the features of the software indicated to me that as with all systems, you must learn the control keys and how to use them properly. As with some of the other systems, this one uses the shape and location of a "block" of the keys to allow cursor control. They are in the following pattern:

```
  I
J K L
,
```

The keys allow you to see the direction in which the cursor will move. The 'K' key is an express key to move the cursor from one end of the line to the other. By the way, all the keys may be re-defined with the information contained in the manual. I use an H-19 terminal and find that with the keys set up for the right-hand keypad and in the shifted mode (so that you don't have to hold down the shift key), it makes it much easier to remember which keys do what.

At first, I felt trapped by the way the cursor immediately went to the right side of the screen and just sat there. I tried (in vain) to move it one

direction or the other, only to have the terminal "beep" at me. The bell indicates an incorrect function attempt and happened because I forgot that to start typing in text I must first type a ";". The semicolon starts Stylograph in the insert mode. This is also for making corrections to the text or adding to it.

Numerous control keys are used to do such things as delete a word, a complete line or a character. A control N will name the error that occured when the bell sounded. A control "P" will replace the text on the screen with information such as input and output file names, format parameters and operating modes and the amount of memory left. When you press the same sequence again, you return to what you were doing and right where you left off. Another feature is the tabbing function control characters. These allow you to set tabs, clear tabs and move the cursor to a tab position. I found that the tab key on the H-19 was useful when modified to work with Stylograph. In the printing industry, a discretionary hyphen is where you tell the typesetting machine the place to enter a hyphen if it is necessary. With this software, it is called a "Ghost Hyphen", but is has the very same nice feature.

Some of the other features of the system with regard to moving the text around are really nice. Depending on the terminal that you use, you may scroll up or down with the "U" and the "M" keys respectively. The "O" and the "." key allow you to move the entire screen length at a time. If that doesn't allow you to get there quickly enough, use the "P" key to call a page number and it will go right there. The pages are automatically generated by Stylograph and are called "serial" pages to distinguish between them and the printed page number. I found that the "F" (find) key is quite useful if you aren't sure which page the information is located on. The software will then move ahead to the first occurance of the word you give it, and then either keep looking or stop, depending on your choice. The replace function is also nice. It allows you to replace some or all of the occurances of a particular string with the one that you specify.

By putting in a marker, you can also move a string from one place in the text to another. Similarly, I found the duplication feature useful for re-occuring words or even paragraphs. With the "Z" (for zap) command you may remove a large portion of text without having to do it a line at a time. Again, this is set up with markers so that only the portions of text marked with the proper key will get "zapped".

When it comes to printing out the information, many times the formatting is the key to making it look good. With the Stylograph software I can center, right justify, justify or set it up for no justif-

ication. Setting the line length, the page length and number, and other such format commands gives you a lot of flexability, yet allows you to do it with ease.

Here is a list of the format commands that may be used with STYLOGRAPH:

Centering
Right Justification
Justify
No Justify
Line Length
Indent
Single Indent
Page Length
New Page
Page Number
Define Header
Define Footer
End Definition
Set Spacing
Space Lines
Vertical Tab
Left Margin set
Character Spacing
Vertical Spacing
Comments

These commands are summarized along with the others on a couple of sheets that may be copied or at least taken out of the book. Also, another page lists the constants used for the various escape and control sequences and the default parameters. These may be changed to fit your needs if you know how and have the desire to do it.

The command mode (entered with a "/") allows you to save the text, kill the text you were working on, or to "append" the text with a file called in any time that you want. This allows "boiler plate" text editing, making it possible to write letters with paragraphs from several text sources. Since our version runs under the FLEX™ operating system, any command that may be called from FLEX may be called by first typing the "+" and then the command line. This is the way to see what is on the catalog or possibly to delete a file on the disk. I'm sure that you must watch what you call in from FLEX, so you don't kill off the program or the file.

By the way, you may also exit to FLEX by typing in the word FLEX after the "Command =" prompt. In the same way the "NEW" command is called, which is the way to erase the text that is currently in the memory.

PRINT is the command to have the text in memory printed out on the printer. This then looks for a print driver named STYPRINT.CMD. This driver is to be renamed from the current one that works with the printer you use. In my case it was a modified "S.CMD" because the printer I use is a serial one. Once PRINT is called for, the Print Driver is loaded from the disk and then a couple of prompts ask you if it should stop for new pages and if you want to limit the number of pages. If the return key is pressed for both of these questions, then the printer fires up and outputs the text unless an "S" key is pressed, which stops it until any other key is pressed.

As I talked to the people at Sonex Systems, it seems that very few problems have occured with the software, and those problems that have occured were ususally with the printer or the print driver. As the manual points out, make sure that you have a print driver that is functioning with your printer before you blame the software.

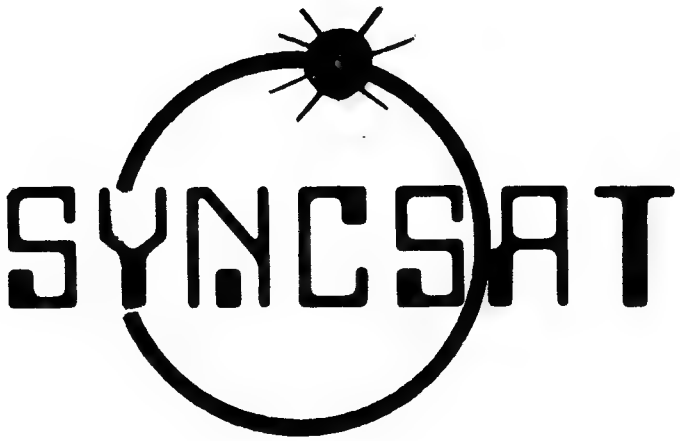
Some of the staff and I feel that there could be more prompts given to aid in the "breaking in" of a new person who will use the system. Most of the people who help with things like word processing are not always versed in using the computer, FLEX and some of the different approaches. It seems that a prompt for the name of a file to save it to would be nice, even though the manual explains the defaults. The approach of some of the other word processors is good where the important prompts are printed on the top (or side) of the screen, and in some cases are able to be shortened or removed entirely by experienced operators.

There are other features that could be incorporated into this system which have not been asked for by enough of us. On the other side of the coin, I know of at least one system for the S-100 bus that has so many features the average user will never learn them all, or use them. However, one of the features that may possibly be available soon for STYLOGRAPH is true proportional spacing. I'm sure it will depend on how many are interested in it and how many are willing to spend some more money to get that feature.

For the price, STYLOGRAPH is one of the best buys for a word processor on the market today. It comes with versions for most terminals and Nec, Diablo, Qume and tty type printers. In addition to the FLEX operating system, there is a STYLOGRAPH for the OS9 system being finished and should be available by the time you read this.

Yes, I feel that word processing is an important part of computing, and that Sonex System's STYLOGRAPH is a very worthwhile investment for the 6809 user.

SS-50



by David Eagle
Lakewood, Colorado

Program "Syncsat" can be used to determine the direction of Geosynchronous Satellites. These types of satellites are useful for weather photography and communications because they appear stationary relative to an observer on the ground. Geosynchronous satellites are placed in orbits about 22,240 miles high and revolve around the earth at the same rate that the earth rotates on its axis.

The direction of any object in the sky can be described by azimuth and elevation angles. Azimuth is an angle measured positive clockwise from north at the observer's location. For example, east is an azimuth angle of 90 degrees, south is 180 degrees, west is 270 degrees and so forth. Elevation is an angle measured positive above the horizon at the observer's location. A negative elevation angle means the object is below the horizon and cannot be seen.

Inputs required by Program "Syncsat" are the observer's latitude and longitude and the satellite's longitude, in degrees. North latitudes are positive and south latitudes are negative. West longitudes are positive and east longitudes are negative.

The Program begins with housekeeping chores and then asks for the observer and satellite locations. The software then checks to see if the satellite is directly overhead. For any satellites overhead, the elevation angle is 90 degrees and the azimuth angle is 0 degrees. If the satellite is not overhead, the elevation angle is computed. Tests are then performed to determine if the azimuth angle is directly north, east, south or west in either the northern or southern hemispheres. If none of these cases are true, the azimuth angle is calculated.

The Program then prints the results and prompts the user for another station and/or satellite calculation. Several examples are included to illustrate the features of Program "Syncsat".

```
0010 * PROGRAM 'SYNCSAT', C.D. EAGLE, FEB.1981
0020 *
0030 * COMPUTES DIRECTION OF GEOSYNCHRONOUS SATELLITES
0040 *
0050 * AZIMUTH= ANGLE, IN DEGREES, POSITIVE CLOCKWISE FROM NORTH
0060 * ELEVATION= ANGLE, IN DEGREES, POSITIVE ABOVE THE HORIZON
0070 *
0080 HOME :LINE=100:D0=57.2957795
0090 *
0100 * REQUEST STATION AND SATELLITE LOCATIONS
0110 *
0120 PRINT :INPUT "STATION LATITUDE(+NORTH, -SOUTH)",L1
0130 PRINT :INPUT "STATION LONGITUDE(+WEST, -EAST)",L2
0140 PRINT :INPUT "SATELLITE LONGITUDE(+WEST, -EAST)",L3
0150 *
0160 * CHECK FOR SATELLITE DIRECTLY OVERHEAD
0170 *
0180 LET A= ABS(L3-L2):B= ABS(L1):IF A<.05 IF B<.05 THEN E=0:D=.5*PI
0190 IF A<.05 IF B<.05 P.#7,TAB(10);"DIRECTLY OVERHEAD":GOTO 420
0200 *
0210 * COMPUTE ELEVATION ANGLE
0220 *
0230 LET A= (L2-L3)/D0:B= COS(L1/D0)*COS(A)
0240 LET C= SQR(1-B*B):D= ATAN((B-.151269174)/C)
0250 *
0260 * SPECIAL CASES (AZIMUTH NORTH, EAST, SOUTH OR WEST)
0270 *
0280 IF A=0 IF L1<0 THEN E= 0:GOTO 420
0290 IF A=0 IF L1>0 THEN E= PI:GOTO 420
0300 IF A>0 IF L1=0 THEN E= .5*PI:GOTO 420
0310 IF A<0 IF L1=0 THEN E= 1.5*PI:GOTO 420
0320 *
0330 * COMPUTE AZIMUTH ANGLE
0340 *
0350 LET F= SIN(A)/C:G= -B*TAN(L1/D0)/C
0360 IF ABS(F)<1E-10 THEN E= 0:GOTO 420
0370 LET E= (2-SGN(F))*.5*PI:IF ABS(G)<1E-10 GOTO 420
0380 LET E=E+SGN(F)*SGN(G)*(ABS(ATAN(F/G))-.5*PI)
0390 *
0400 * PRINT RESULTS
0410 *
0420 PRINT #7:P.#7,TAB(10);"STATION LOCATION"
0430 PRINT #7:P.#7,TAB(15);"LATITUDE",L1;TAB(50);"LONGITUDE",L2
0440 PRINT #7:P.#7,TAB(10);"SATELLITE LONGITUDE",L3
0450 PRINT #7:P.#7,TAB(15);"AZIMUTH",E*D0;TAB(50);"ELEVATION",D*D0
0460 *
0470 * REQUEST ANOTHER STATION AND/OR SATELLITE
0480 *
0490 PRINT :INPUT "ANOTHER STATION(1=YES, 0=NO)",H:IF H=1 GOTO 120
0500 PRINT :INPUT "ANOTHER SATELLITE(1=YES, 0=NO)",H:IF H=1 GOTO 140
0510 END
```

PROGRAM SYNCSAT

STATION LOCATION

LATITUDE	45	LONGITUDE	104
SATELLITE LONGITUDE	75		
AZIMUTH	141.906716	ELEVATION	30.7319033

STATION LOCATION

LATITUDE	-45	LONGITUDE	104
SATELLITE LONGITUDE	75		
AZIMUTH	38.0932995	ELEVATION	30.7319033

DIRECTLY OVERHEAD

STATION LOCATION

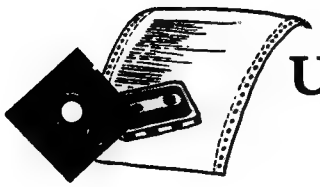
LATITUDE	0	LONGITUDE	105
SATELLITE LONGITUDE	105		
AZIMUTH	0	ELEVATION	89.9999993

STATION LOCATION

LATITUDE	-67.5	LONGITUDE	-107
SATELLITE LONGITUDE	-95.4		
AZIMUTH	347.473313	ELEVATION	13.5599629

STATION LOCATION

LATITUDE	45	LONGITUDE	108
SATELLITE LONGITUDE	108		
AZIMUTH	179.999999	ELEVATION	38.1699211



Utility Corner

RELOCATE YOUR P.I.C. FILES

by Joe Turner

Here's a new FLEX (tm TSC) utility to add to your collection. RELOCATE will move your P.I.C. (position independent code) files to any specified address. This is especially helpful when you are working with binary files that are composed of several non contiguous segments, as without RELOCATE the usual way to move these files is to use RUN to get them into the desired memory area, then several SAVEs, one for each segment, then an APPEND. Not at all fun. Or, if you are working with binary files that would overwrite FLEX if loaded into memory, some help is clearly needed.

I find a regular need to move 6809 programs (from another system containing removable ROM at $C000, without mentioning any names, buts its initials are Radio Shack) for disassembly by our DYNAMITE (tm CSC) disassembler package. Load one of these babies into its usual address, and it's "Goodbye, FLEX". Until I finally wrote RELOCATE, I used EXAMINE (from the TSC 6809 DIAGNOSTICS package) to manually change the binary file load and transfer addresses. That works, but takes some time, and is quite tedious and error-prone. RELOCATE just works.

Understanding the Problems

To understand the problems involved, we need to consider how binary files are stored by FLEX. This is explained in detail on page 45 of the FLEX Advanced Programmer's Guide (a part of the standard TSC or SWTPC FLEX package). Each binary record is composed of up to 255 bytes which can have a load address beginning anywhere in the 64K memory address space.

RELOCATE gets a new load address from its command line, and subtracts this value from the FIRST load address encountered, resulting in an offset, which is then held constant. The input file is then rewound, and read again from the beginning, only this time the constant offset calculated earlier is subtracted from each load and transfer address encountered. The output file is written a byte at a time, just as the input file is read, only all the load and transfer addresses are modified by the constant offset.

Notice that, except for the two File Control Blocks, RELOCATE doesn't use any dedicated storage RAM. This was done deliberately to illustrate some techiques of eliminating such dedicated RAM. One of these is seen in line 110, where the otherwise unused Y register is used to hold the constant offset. Of course, in a more complex program, this most likely wouldn't be done becauce Y would be used more generally. But in a simple program like this that does all its I/O through FLEX (which requires arguments in X, for 6800 compatability), the Y register is just sitting there, and might as well be used for something. Later, in lines 127 and 185, Y is pushed onto the S stack, and then subtracted from D in a position-independent manner.

In a similar case, X holds the result of GETHEX, and is pushed onto the S stack (line 102) and subsequently subtracted from D using stack-relative addressing, which is position-independent.

Line 133 shows a byte counter being pushed onto the S stack, and that counter is later (line 137) accessed with stack-relative addressing. Note the use of an extra pull instruction (line 140) to clean up the stack. This is sometimes done with a LEAS 1,S instruction which accomplishes the same thing, namely incrementing S by one to restore its previous condition.

A FEW MORE DETAILS OF RELOCATE

While I'm on my soap-box, let me also point out a few other details of RELOCATE, these not having anything to do with relocatability, but which are considered (by me, at least) to be desirable ways to do things.

You will note that the listing of RELOCATE begins with line 4, rather than line 1. What happened to the first three lines? This is the key to correct pagination with TSC's Macro Assembler. The first three lines consist of a OPT PAG pseudo-op, a TTL pseudo-op with title, and a PAG directive to force a new page. When you call the assembler, then, include on the command line the option "P1" it must be the last option specified) to cause the listing to begin on page one, rather than on page zero.

Of course, for this utility to be of any use in relocating programs to RUN at other addresses, the programs to be moved must consist of P.I.C. This means that the program must be written so that it will behave properly regardless of where it is placed in memory. There are several features of the 6809 microprocessor that makes it easy to write programs that have this attribute, and some of these features are used in RELOCATE, which itself is P.I.C., AND CAN BE RUN AT ANY ADDRESS. Let's consider some of the techniques needed to produce P.I.C.

THE KEY TO P.I.C.

The key to P.I.C. is making all internal program references with relative-addressing modes, and equally important, making external references, such as to the operating system, with absolute addressing. For example, RELOCATE uses two FCBs (file control blocks), one for read, and one for write. These are both at the end of the utility,

and will move if the utility is moved. Therefore all references to the FCBs within RELOCATE are made with a relative addressing mode, in this case with Program Counter Relative, or PCR addressing.

Line 67 of our utility contains such a reference. If the conventional "LDX #FCB" were used, this would have been an absolute reference, and the utility could not run at another address. Note that if the reference were to FLEX's internal SYSFCB at $C840, the reference MUST be made with absolute addressing for RELOCATE to be relocatable. Something has to stand still, and FLEX is it.

Most programs will contain many BSR's (branch to subroutines), and these use relative addressing. Just don't forget that when the branches exceed their usual 7-bit range, use the relative LBSR (long branch to subroutine) rather than the absolute JSR (jump to subroutine) when calling subroutines WITHIN the utility. An example of this is in line 104 of RELOCATE. However operating system calls MUST be obsolute, as in line 76. Remember, FLEX doesn't move.

Notice the version number, beginning in line 61. This is compatible with SWTPC's VER utility, but will yield a not-very-useful version number of 129 if TSC's VERSION is used. I much prefer *Southwest's* method of handling this aid to program maintenance, although it is quite different from the simple method originally proclaimed (but not always used) by the folks in West Lafayette.

FLEX requires that a flag be set to indicate a binary file has been opened for read or write. This is always done just after the file has been opened (as in lines 79 and 80). Unfortunately the FLEX manual forgets to warn that this flag must be reset after doing a REWIND of an open file, as in lines 112-118. Do it.

IN CONCLUSION

Those of us who are fortunate enough to have a printer that prints lower-case characters should take advantage of our blessings and use lower case wherever possible in commenting programs. Readability is definitely enhanced. Don't worry about the people with old-fashioned printers that print only 64 of the ASCII characters. Most of the older printers are designed to automatically print an "A" for an "a", and so on, and for those that don't, the printer driver can easily be modified to set bit 5 low for all alphabetic characters, thereby taking care of the problem.

This advice goes double for messages within the program that are going to be seen when the program runs (error messages and so on). You and others are going to have to look at this stuff for a long time. Make it pretty!

TSC's excellent 6809 Macro Assembler does have a few shortcomings, one of them being an inability to sense or directly indicate a wasted 16-bit constant offset in PCR instructions. The programmer has the responsibility of inserting a " " before the referenced label, as in line 143. Each one you put in shortens the program by one byte, assuming the target label is close enough. Look at the object code produced to see if any 16-bit offsets could be reduced to 8 bits. Anything over 007F is wasteful. Note that line 124 comes within one byte of this, for example.

I hope that these comments will help you to think about P.I.C. a little more before you write your next utility. And when you're finished with your program, don't keep it to yourself. Publish it! You may save someone else the time and trouble required to write another useful utility.

```
                        * RELOCATE position-independent-program
                        *
                        * by  Joe Turner    January 9, 1981
                        *
                        *     Computer Systems Center
                        *     13461 Olive Blvd.
                        *     Chesterfield, MO  63017
                        *     (314) 576-5020
                        *
                        * This utility was written for publication in
                        * SS-50 COMPUTING.  It is hereby placed in the
                        * public domain.
                        *
                        * This FLEX (TM of TSC) utility allows changing the
                        * default load address of any binary file.
                        * Naturally, the file must be written as position-
                        * independent-code in order to run at the new
                        * address!
                        *
                        * To operate, call program as follows:
                        *
                        * RELOCATE,<input file>,<output file>,<load addr.>
                        *
                        * Both input and output file specifications default
                        * to .CMD extension on the current WORKING drive.
                        *
                        * The desired load address for the (new) output
                        * file is given in hexadecimal (with no leading $).
                        *
                CD03    WARMS   EQU     $CD03       courtesy of TSC
                CD1E    PSTRNG  EQU     $CD1E       likewise
                CD2D    GETFIL  EQU     $CD2D       "
                CD33    SETEXT  EQU     $CD33       "
                CD42    GETHEX  EQU     $CD42       "
                D403    FMSCLS  EQU     $D403       "
                D406    FMS     EQU     $D406       "
                003B    SPCCMP  EQU     59          space-compression flag
                0001    OPENRD  EQU     1           open for read command
                0002    OPENWR  EQU     2           open for write command
                0005    REWIND  EQU     5           rewind file command
                0002    CMD     EQU     2           default extension
                0002    BINREC  EQU     $02         start of record indicator
                0016    XFRADR  EQU     $16         transfer address indicator
                0008    EOF     EQU     8           end-of-file error
                0004    EOT     EQU     4           string terminator
C100                            ORG     $C100       position-independent
C100 20   05          RELOC   BRA     START
C102 81                         FCB     $81         version # 1.9:1
C103 2E                         FCB     '.
C104 89                         FCB     $89
C105 3A                         FCB     ':
C106 81                         FCB     $81
C107 30   8D 01D1     START   LEAX    RDFCB,PCR
C10B BD   CD2D                  JSR     GETFIL      get input file name
C10E 1025 0098                  LBCS    INSPER
C112 86   02                    LDA     #CMD
C114 BD   CD33                  JSR     SETEXT
C117 86   01                    LDA     #OPENRD
C119 A7   84                    STA     0,X
C11B BD   D406                  JSR     FMS         open input file
C11E 1026 008D                  LBNE    INOPER
```

```
 78
 79   C122 86   FF              LDA    #-1
 80   C124 A7   88 3B           STA    SPCCMP,X  set binary
 81
 82   C127 30   8D 02F1         LEAX   WRFCB,PCR
 83   C12B BD   CD2D            JSR    GETFIL    get output file name
 84   C12E 1025 0083            LBCS   OUTSER
 85
 86   C132 86   02              LDA    #CMD
 87   C134 BD   CD33            JSR    SETEXT
 88
 89   C137 86   02              LDA    #OPENWR
 90   C139 A7   84              STA    0,X
 91   C13B BD   D406            JSR    FMS       open output file
 92   C13E 26   7B              BNE    OUTOER
 93
 94   C140 86   FF              LDA    #-1
 95   C142 A7   88 3B           STA    SPCCMP,X  set binary
 96
 97   C145 BD   CD42            JSR    GETHEX    get load addr. from command
 98   C148 25   77              BCS    NOADDR
 99   C14A 5D                   TSTB
100   C14B 27   74              BEQ    NOADDR
101
102   C14D 34   10              PSHS   X         save load address
103
104   C14F 17   0094            LBSR   READ      get first char. in file
105   C152 81   02              CMPA   #BINREC   is it binary record flag ?
106   C154 26   71              BNE    NOTBIN
107
108   C156 17   0084            LBSR   RDADDR    read file's first load addr.
109   C159 A3   E1              SUBD   0,S++     calculate offset
110   C15B 1F   02              TFR    D,Y       save it
111
112   C15D 86   05              LDA    #REWIND
113   C15F A7   84              STA    0,X
114   C161 BD   D406            JSR    FMS       rewind input file
115   C164 26   3F              BNE    DSKERR
116
117   C166 86   FF              LDA    #-1
118   C168 A7   88 3B           STA    SPCCMP,X  restore binary flag
119
120   C16B 8D   79      MAINLP  BSR    READ      main record loop
121   C16D 81   02              CMPA   #BINREC   start of record ?
122   C16F 26   5C              BNE    CHKXFR
123
124   C171 17   0080            LBSR   WRITE     copy start-of-record
125
126   C174 8D   67              BSR    RDADDR    get load addr.
127   C176 34   20              PSHS   Y
128   C178 A3   E1              SUBD   0,S++     modify it
129   C17A 8D   74              BSR    WRADDR    store in output file
130
131   C17C 8D   68              BSR    READ      get record size
132   C17E 8D   74              BSR    WRITE     copy to output file
133   C180 34   02              PSHS   A         save size for counter
134
135   C182 8D   62      RECLP   BSR    READ      copy one binary record
136   C184 8D   6E              BSR    WRITE     one byte at a time
137   C186 6A   E4              DEC    0,S       byte counter
138   C188 26   F8              BNE    RECLP     record finished ?
139
140   C18A 35   02              PULS   A         fix stack
141   C18C 20   DD              BRA    MAINLP
142
143   C18E 30   8C 69   FINISH  LEAX   <COMPMS,PCR
144
145   C191 BD   CD1E    EXIT    JSR    PSTRNG
146   C194 BD   D403            JSR    FMSCLS
147   C197 7E   CD03            JMP    WARMS     back to +++
148
149   C19A A6   01      CHKEOF  LDA    1,X       get error code
150   C19C 81   08              CMPA   #EOF      legal end-of-file ?
151   C19E 27   EE              BEQ    FINISH
152
153   C1A0 20   03              BRA    DSKERR    no
154
155   C1A2 4D           CHKEND  TSTA              end of file ?
156   C1A3 27   E9              BEQ    FINISH
```

```
157
158   C1A5 30   8C 67    DSKERR  LEAX   <DERRMS,PCR
159   C1A8 20   E7               BRA    EXIT
160
161   C1AA 30   8C 7D    INSPER  LEAX   <INSPMS,PCR
162   C1AD 20   E2               BRA    EXIT
164   C1AF 30   8D 0097  INOPER  LEAX   INOPMS,PCR
165   C1B3 20   DC               BRA    EXIT
166
167   C1B5 30   8D 00AD  OUTSER  LEAX   OUTSMS,PCR
168   C1B9 20   D6               BRA    EXIT
169
170   C1BB 30   8D 00C8  OUTOER  LEAX   OUTOMS,PCR
171   C1BF 20   D0               BRA    EXIT
172
173   C1C1 30   8D 00DF  NOADDR  LEAX   NADRMS,PCR
174   C1C5 20   CA               BRA    EXIT
175
176   C1C7 30   8D 00F6  NOTBIN  LEAX   NOTBMS,PCR
177   C1CB 20   C4               BRA    EXIT
178
179   C1CD 81   16       CHKXFR  CMPA   #XFRADR   xfer addr. flag ?
180   C1CF 26   D1               BNE    CHKEND
181
182   C1D1 8D   21               BSR    WRITE     copy it
183
184   C1D3 8D   08               BSR    RDADDR    get transfer addr.
185   C1D5 34   20               PSHS   Y
186   C1D7 A3   E1               SUBD   0,S++     modify it
187   C1D9 8D   15               BSR    WRADDR    store in output file
188   C1DB 20   8E               BRA    MAINLP
189
190   C1DD 8D   07       RDADDR  BSR    READ      read address MS byte
191   C1DF 1F   89               TFR    A,B       save it
192   C1E1 8D   03               BSR    READ      read LS byte
193   C1E3 1E   89               EXG    A,B       put in proper order
194   C1E5 39                    RTS
195
196   C1E6 30   8D 00F2  READ    LEAX   RDFCB,PCR read one byte
197
198   C1EA BD   D406     RDWR    JSR    FMS       read or write one byte
199   C1ED 26   AB               BNE    CHKEOF
200
201   C1EF 39                    RTS
202
203   C1F0 8D   02       WRADDR  BSR    WRITE     write address MS byte
204   C1F2 1F   98               TFR    B,A       get LS byte
205
206   C1F4 30   8D 0224  WRITE   LEAX   WRFCB,PCR write one byte
207   C1F8 20   F0               BRA    RDWR
208
209   C1FA 52 65 6C 6F   COMPMS  FCC    "Relocation complete.",EOT
210   C20F 44 69 73 6B   DERRMS  FCC    "Disk file read/write error",EOT
211   C22A 49 6E 70 75   INSPMS  FCC    "Input file specification error.",EOT
212   C24A 49 6E 70 75   INOPMS  FCC    "Input file can't be opened.",EOT
213   C266 4F 75 74 70   OUTSMS  FCC    "Output file specification error.",EOT
214   C287 4F 75 74 70   OUTOMS  FCC    "Output file can't be opened.",EOT
215   C2A4 41 64 64 72   NADRMS  FCC    "Address specification error.",EOT
216   C2C1 46 69 6C 65   NOTBMS  FCC    "File not in binary format.",EOT
217
218   C2DC               RDFCB   RMB    320       read FCB
219   C41C               WRFCB   RMB    320       write FCB
220
221                              END    RELOC

0 ERROR(S) DETECTED
SYMBOL TABLE:

BINREC 0002   CHKEND C1A2   CHKEOF C19A   CHKXFR C1CD   CMD    0002
COMPMS C1FA   DERRMS C20F   DSKERR C1A5   EOF    0008   EOT    0004
EXIT   C191   FINISH C18E   FMS    D406   FMSCLS D403   GETFIL CD2D
GETHEX CD42   INOPER C1AF   INOPMS C24A   INSPER C1AA   INSPMS C22A
MAINLP C16B   NADRMS C2A4   NOADDR C1C1   NOTBIN C1C7   NOTBMS C2C1
OPENRD 0001   OPENWR 0002   OUTOER C1BB   OUTOMS C287   OUTSER C1B5
OUTSMS C266   PSTRNG CD1E   RDADDR C1DD   RDFCB  C2DC   RDWR   C1EA
READ   C1E6   RECLP  C182   RELOC  C100   REWIND 0005   SETEXT CD33
SPCCMP 003B   START  C107   WARMS  CD03   WRADDR C1F0   WRFCB  C41C
WRITE  C1F4   XFRADR 0016
```

INTRODUCING

6809 SOFTWARE POWER TOOLS

BY MICROWARE

OS-9™ LEVEL TWO MULTIUSER OPERATING SYSTEM

True multitasking, multiuser OS for timesharing or real-time control applications.

■ Sophisticated memory management permits use of over one megabyte.

■ Versatile, easy-to-use input/output supports multiple devices.

■ UNIX™-like file structure including hierarchical directories, pipes, filters, and byte-addressable random access files.

■ Provides log-on password protection and user file security.

■ Can run on small, inexpensive systems with floppy disks and as little as 32K memory.

☐ $495.00*

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Single-user, single-memory map compatible subset of Level Two for software development or stand-alone control applications.

■ Versatile input/output system can support multiple devices using interrupt-driven, DMA, or program-controlled data transfer. Users can easily add additional I/O devices.

■ Tape or disk-based versions available.

■ Disk versions support UNIX™-like hierarchical directory structure and byte-addressable random-access files.

■ Memory management for single address-space (up to 64K).

☐ Disk version $150.00*

☐ Tape version $95.00

BASIC09™ PROGRAMMING LANGUAGE SYSTEM

Extended BASIC language compiler/interpreter with integrated text editor and debug package. Runs standard BASIC programs *or* minimally-modified PASCAL programs.

■ Permits multiple named program modules having local variables and identifiers. Modules are reentrant, position independent and ROMable.

■ Additional control statements for structured programming: IF ... THEN ... ELSE, FOR ... NEXT, REPEAT ... UNTIL, WHILE ... DO, LOOP ... ENDLOOP, EXITIF ... ENDEXIT.

■ Allows user-defined data types and complex data structures. Five built-in data types: byte, integer, 9 digit floating-point, string and boolean.

■ Extremely fast program execution.

■ Available on ROM, disk or cassette tape. Runs under OS-9™ Level One or Level Two.

☐ Disk or tape $195.00*

MICROSOFT 6809 BASIC

Standard Microsoft BASIC optimized for the 6809 and OS-9™.

■ Four data types: integer, string, single precision and double precision floating point.

■ Program trace and edit capabilities.

■ Automatic line numbering and renumbering.

■ Supports random and sequential file I/O. Full PRINT USING for formatted output.

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Minimum-keystroke macro text editor useful for text preparation or interactive word processing.

■ User-defined macros with parameters permit virtually unlimited command expansion. Macros can be saved, loaded and edited.

■ Buffer, line and character oriented commands.

■ Search, change and extend operations.

■ Permits multiple input/output files.

☐ Disk or tape $75.00

☐ ROM set (2716) $90.00

OS-9™ INTERACTIVE ASSEMBLER

Compact Motorola compatible assembler for machine language program development.

■ Operates in "batch" mode *or* interactive line-by-line mode.

■ Facilities for generation of OS-9™ memory modules and system calls.

■ Formatted listings include syntax *and* context error checking.

■ Runs on OS-9™ Level One or Level Two.

☐ Disk or tape $75.00

☐ ROM set (2716) $90.00

OS-9™ INTERACTIVE DEBUGGER

Facilitates testing and debugging of machine- language programs.

■ Includes common "monitor" functions: memory examine/change, breakpoints, display/change registers, hexadecimal arithmetic, etc.

■ Access to system command interpreter.

■ Available on ROM, disk or cassette tape.

☐ Disk or tape $35.00

☐ ROM (2716) $50.00

BASIC 09 is a trademark of Motorola. OS-9 is a trademark of Motorola and Microware®. UNIX is a trademark of Bell Telephone Laboratories.

Most software is available on ROM, diskette and tape in versions for many popular 6809 computers. Source listings and yearly maintenance/update service are sold separately for most programs.

*Specify manufacturer and type of CPU and I/O controllers. Contact Microware® for specific availability.

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5835 Grand Avenue, Box 4865
Des Moines, Iowa 50304
(515) 279-8844

INNOVATION AND PERFORMANCE

6800 SOFTWARE SUPER POWER

BY MICROWARE

A/BASIC COMPILER

This BASIC compiler generates pure, fast, efficient 6800 machine language from easy to write BASIC source programs. Uses ultra-fast integer math, extended string functions, boolean operators and real-time operations. Output is ROMable and *runs without any run-time package.* Disk versions have disk I/O statements and require 12K memory and host DOS. Cassette version runs in 8K and requires RT/68 operating system.

☐ Disk Extended Version 2.1 SSB or FLEX* Diskette $150.00
☐ Cassette Version I.O. $65.00

A/BASIC SOURCE GENERATOR

An "add-on" option for A/BASIC Compiler disk versions that adds an extra third pass which generates a full assembly-language output listing *and* assembly language source file. Uses original BASIC names and inserts BASIC source lines as comments.

☐ SSB or FLEX* Diskette $75.00

A/BASIC INTERPRETER

Here it is - a super-fast A/BASIC compiler! Now you can interactively edit, execute and debug A/BASIC programs with the ease of an interpreter - then compile to super efficient machine language. Also a superb stand-alone applications and control- oriented interpreter. Requires 8K RAM. The cassette version is perfect for Motorola D2 kits.

☐ Cassette, SSB or FLEX* Diskette $95.00

LISP INTERPRETER

The programming Language LISP offers exciting new possibilities for microcomputer applications. A highly interactive interpreter that uses list-type data structures which are simultaneously data and executable instructions. LISP features an unusual structured, recursive function-oriented syntax. Widely used for processing, artificial intelligence, education, simulation symbolic, and computer-aided design. 6800 LISP requires a minimum of 12K RAM.

☐ Cassette, SSB or FLEX* Diskette $75.00

*FLEX is a trademark of Technical Systems Consultants

RT/68 REAL TIME OPERATING SYSTEM

MIKBUG — compatible ROM that combines an improved monitor/debugger with a powerful multitasking real-time operating system. Supports up to 16 concurrent tasks at 8 priority levels plus real time clock and interrupt control. Thousands in use since 1976 handling all types of applications. Available on 6830 (MIKBUG-type) or 2708 (EPROM-type) ROM. Manual is a classic on 6800 real-time applications and contains a full source program listing.

☐ RT68MX (6830) $55.00
☐ RT68MXP (2708) $55.00

6800 CHESS

A challenging chess program for the 6800. Two selectable difficulty levels. Displays formatted chess boared on standard terminals. Requires 8K memory. Machine language with A/BASIC source listing.

☐ Cassette, SSB or FLEX* Diskette $50.00

Our software is available for most 6800 systems on cassette or diskette unless otherwise noted. Phone orders welcomed. We accept MASTERCHARGE and VISA. We try to ship orders within 24 hours of receipt. Please call or write if you require additional information or our free catalog. Microware® software is available for OEM and custom applications.

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STYLOGRAPH WORD PROCESSOR FOR OS-9™

Stylograph is a full-featured screen-oriented word processing program for creating and printing documents. Stylograph's interactive operation and human-engineered features make it the most accurate and easy-to-use kind of document-preparation system. Cursor-based editing commands and real-time screen refresh always gives an accurate picture of what the printed document will look like.

■ Powerful Editing Commands

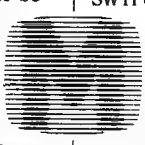
The display cursor can be moved character-by-character, line-by-line, or page-by-page in any direction. The full compliment of "cut-and-paste" edit commands permit blocks of text to be moved, copied, searched for, replaced and deleted. The "global replace" command searches for each occurance of a given text string and allows selective replacement with another string. In the "insert" mode the text is actually formatted before your eyes as you type!

■ Complete Formatting Control

Text or individual lines can be center, left, right, or left-and-right justified; page and line width can be specified; multiple tabs can be set anywhere. You can define page heading, footers, page numbering, identation and line spacing.

■ Versatile Video Terminal Interface

The basic Stylograph module uses a "personality module" to define the display control codes used by many brands of video terminals and memory-mapped video displays including: Hazeltine 1400/1500 series; Lear-Seigler ADM3-A; GIMIX 80x24; SWTPC CT-82 and 8212; and ADDS Regent series.



☐ $175.00
☐ For proportional printers $195.00

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FIXING I/0 BUGS IN SWTPC BASIC 3.5

Geoffrey A. Gass
Portland, Oregon

Those who purchased the SWPTC DMAF-1 for a 6800 system in 1978-1979 received Robert Uiterwyk's FLEX-compatible DISK BASIC 3.5 as part of the software package.

With it came two I/0 bugs--one of long standing and rather minor, and the other brand new and potentially catastrophic.

It's long been a feature of SWTPC BASIC's that up to 8 I/0 devices may be independently addressed in INPUT and PRINT statements. It's also been a feature that the I/0 routines always test a called I/0 port to see that an interface is actually installed before trying to read or write data.

Unfortunately, the test used is valid only for a *parallel* interface. The software reads the fourth interface register, which, for a parallel interface, is the control register for the "B" side of the PIA. The internal logic of the PIA is such that bits 5 and 6 of this register cannot both be high at the same time. If the software sees $FF here, it "knows" that there is no interface here, and outputs an error message.

For a serial interface, however, reading the fourth port address reads the ACIA *data* register, and for a port configured for 8 data bits, $FF is not only possible, but in some systems will be a probable data byte.

So here's a minor bug that's been with SWTPC (and also MSI) BASIC's for a long time--occasional or frequent refusal to read from or write to a serial port.

CHANGE THE ROUTINE

The fix is to change the PORSET routine, to look at two consecutive interface registers, and generate the error message only if *both* read $FF (see lines 770-820 in the listing). In a serial interface, the status register, which appears at the even-numbered addresses, cannot have bits 1 and 3 both high at the same time. A reading of $FF for both registers means there cannot be either an ACIA or a PIA at the port address.

That takes care of the minor bug.

NOW for the Catastrophic One

An I/0 port is identified in a BASIC I/0 statement by a number, which may

be computed by evaluation of an expression if the programmer so desires--e.g., "PRINT #(N*M-6)". Since there are only 8 sets of pointers to I/O driver routines, some means must be provided to trap illegal values here.

Earlier versions of Uiterwyk's BASIC interpreters simply checked the indicated port-number, and if it came up 8 or greater jumped directly to a pointer to "ERROR #6" (Illegal arithmetic).

In BASIC 3.5, though, a new wrinkle was added. Rather than jumping directly to an error routine, the program assigned "Port 9" as the number of any illegal expression, and then put jumps to the error-message routine where the "Port 9" input, output and initialization routine pointers should be in the I/O jump table. At least, that was the intent.

MISCALCULATED

Unfortunately, the arithmetic was miscalculated. The computed jumps for "Port 9" were off by two bytes--and the initialization routine jump wound up walking into the "RND" text in the function table -- Bombsville!

Rather than creating a phony "Port 9" and a jump-table offset of 9 x 9 = 81, the revised code of the listing here simply gets the correct offset ($4F = 79) into ACC A, and uses it at PORST4 to reach the error-routine pointers.

The two fixes together relocate most of the code between $1461 and $14AD. In the process, a NOP at $14A8 was tossed out (not needed: it's the WAI that sometimes needs a NOP, not the CLI instruction).

If any further patching is needed in this area, the INX INX INX at $14A6 can be thrown out, and the instruction at $14AA changed to JSR 3,X (AD 03) -- freeing up three bytes.

continued page 26

```
00010                    NAM    BASICIOP Patch to BASIC 3.5
00020                *   Rev 0.0  September 9, 1980
00030                    OPT    O,S,NOG

00050                *External References

00070       0034     POSIT  EQU    $34
00080       0B99     SPSKIP EQU    $0B99
00090       0096     CTLPOR EQU    $96
00100       0869     NUMEVL EQU    $0869
00110       075F     NUMCK  EQU    $075F
00120       1657     ILARTH EQU    $1657
00130       0090     PORADR EQU    $90
00140       0106     JMPTAB EQU    $0106
00150       008C     OUTADR EQU    $8C
00160       008E     INADR  EQU    $8E
00170       0CE9     ERRORS EQU    $0CE9

00190 1438               ORG    $1438

00210                *CTLP sets up control-port I/O

00230 1438 96 96    CTLP   LDA A  CTLPOR   Port number for Control
00240 143A 20 25           BRA    PORCHK

00260                *PORSET establishes I/O port (default = Control port

00280 143C DE 34    PORSET LDX    POSIT    Scan pointer
00290 143E BD 0B99         JSR    SPSKIP   Get next non-space character
00300 1441 81 23           CMP A  #$23     Check for "#"
00310 1443 26 F3           BNE    CTLP     No #; get default port
00320 1445 08              INX             Was a #
00330 1446 BD 0869         JSR    NUMEVL   Evaluate Port # expression
00340 1449 27 10           BEQ    PTERM    Have a terminator?
00350 144B 81 2C           CMP A  #$2C     A comma, maybe
00360 144D 27 0B           BEQ    PDELIM
00370 144F 81 3B           CMP A  #$3B     Semicolon?
00380 1451 27 07           BEQ    PDELIM
00390 1453 81 3A           CMP A  #$3A     Colon?
00400 1455 27 04           BEQ    PTERM    Terminates this statement
00410 1457 7E 1657         JMP    ILARTH   Call it illegal arithmetic.
00420 145A 08       PDELIM INX             Past delimiter
00430 145B DF 34    PTERM  STX    POSIT    Scan pointer
00440 145D BD 075F         JSR    NUMCK    Check for 1-255 only
00450 1460 17              TBA             OK. Value is in ACC B.

00470 1461 81 08    PORCHK CMP A  #$08     7 is highest valid Port #
00480 1463 25 09           BCS    PORST1   Looks OK.
00490 1465 7F 0090         CLR    PORADR   Set MSB = 00
00500 1468 97 91           STA A  PORADR+1 LSB = bum number
```

```
00510 146A 86 4F          LDA A  #$4F      Value to reach error pointers
00520 146C 20 12          BRA    PORST4

00540 146E 16       PORST1 TAB              Port number into ACC B
00550 146F 48              ASL A            X2
00560 1470 48              ASL A            X4
00570 1471 91 91           CMP A  PORADR+1  Check current port
00580 1473 26 01           BNE    PORST2    Not the same. Set up new one.
00590 1475 39              RTS              No change. Exit now.

00610 1476 36       PORST2 PSH A            Save Port #
00620 1477 97 91           STA A  PORADR+1  LSB set
00630 1479 86 80           LDA A  #$80      MSB is always $80
00640 147B 97 90           STA A  PORADR
00650 147D 32              PUL A            Port #, X4
00660 147E 48       PORST3 ASL A            X8
00670 147F 1B              ABA              X9
00680 1480 CE 0106 PORST4  LDX    #JMPTAB   Start of I/O jump table
00690 1483 DF 8C           STX    OUTADR    Output routine reference
00700 1485 DF 8E           STX    INADR     Input routine reference
00710 1487 9B 8D           ADD A  OUTADR+1  LSB
00720 1489 97 8D           STA A  OUTADR+1  0106 + 9 X Port # = OUTADR
00730 148B 8B 03           ADD A  #3        For input routine
00740 148D 97 8F           STA A  INADR+1   INADR now set
00750 148F 96 90           LDA A  PORADR    MSB. Should be $80
00760 1491 27 11           BEQ    INZSET    00? Bummer. Error sequence.
00770 1493 DE 90           LDX    PORADR    Get complete address
00780 1495 A6 03           LDA A  3,X       Check 4th register
00790 1497 81 FF           CMP A  #$FF      Look for unwired port
00800 1499 26 09           BNE    INZSET    OK
00810 149B A1 02           CMP A  2,X       Check 3rd register
00820 149D 26 05           BNE    INZSET    Not also $FF? OK.
00830 149F C6 26           LDA B  #$26      'Invalid port' error
00840 14A1 7E 0CE9         JMP    ERRORS

00860 14A4 DE 8E    INZSET LDX    INADR     Address of input routine
00870 14A6 08              INX
00880 14A7 08              INX
00890 14A8 08              INX              Plus 3 = INZ routine
00900 14A9 0F              SEI
00910 14AA AD 00           JSR    0,X       Do initialization
00920 14AC 0E              CLI              Re-enable interrupts
00930 14AD 39              RTS

00950                      END
POSIT  0034   ERRORS 0CE9     ILARTH 1657      PORCHK 1461
SPSKIP 0B99   CTLP   1438     PORADR 0090      PORST1 146E
CTLPOR 0096   PORSET 143C     JMPTAB 0106      PORST2 1476
NUMEVL 0869   PDELIM 145A     OUTADR 008C      PORST3 147E
NUMCK  075F   PTERM  145B     INADR  008E      PORST4 1480
                                               INZSET 14A4
TOTAL ERRORS 00000
```

[*SS-50*]

continued from page 8

chips will cost less than $100.00 for 64K! Not bad at all--compare that to a few short years ago.

The prices for a complete kit less memory is $190.00. If you prefer not to build a kit, the assembled and tested board (without 4116's) is only $230.00. For other options, see the ad in this issue, or contact BOAZ Co., Box 18081, San Jose, Ca. 95158.

This board is designed very well, it works well, and the price is excellent. For anyone interested in expanding their system, the BOAZ D64KB is an excellent 64K dynamic memory.

[*SS-50*]

New Products

The Mdisk + 09 is a new 6809 DOS for the LFD-400 disk system written specifically for the 6809 processor. It includes many advanced features found only in large disk operating systems without the large requirements made by such systems and also allows a much more flexable environment in which it will operate. It allows the user to have mixed 35,40 and 80 track drives in the same system and to use the full potential of each drive with enhanced step rate for both 40 and 80 track drives. The user also has control over error checking whether using data compare, read checking or no file checking at all for maximum throughput.

Mdisk + *09* features a resident command set and the File Information Block (FIB) system for disk file communication.

With all of these advanced features, Mdisk + 09 only occupies 3K of address space, with a choice of EPROM on the disk controller card, EPROM on the CPU card, or in RAM. Additionally, 1K of RAM selectable by the user.

It is also an excellent DOS for use in a switchable 6800/6809 system. This may be accomplished by locating Mdisk + *09* on the processor card and the 6800 DOS on the disk controller.

Instructions necessary to switch from 6800 to 6809 and I/O switching is supplied with it.

For further information contact: Cer-Comp, 5566 Ricochet Ave., Las Vegas, NV 89110, (702) 452-0632.

UniFLEX Gains Sort/Merge Package

Technical Systems Consultants, Inc. has announced the availability of a full-disk sort/merge package for operation with the 6809 UniFLEX Operating System. Written in 6809 assembler language, the package features a convenient operator interface and very fast sorts. Any size and type file may be sorted with parameters for the sort supplied as part of the command line, through use of a "parameter editor", or in an existing parameter file. The package sorts files of any size by breaking them into multiple, temporary files which are individually sorted and then merged into one. It also performs merges on previously sorted files. But input and output can be routed to most any device through the facilities of UniFLEX. Some of the packages features include, any size, fixed ot variable length input records, fixed or variable length fields, up to 20 input to output keys, key length of up to 250 characters, supports ascending or descending and right or left justified keys, user-definable sorting sequence, run-time messages, and a powerful record select/exclude feature. A single quantity license is $100.00 with maintenance available for $50.00 per year from Technical Systems Consultants, Inc., P.O. Box 2570, West Lafayette, IN 47906. Telephone: (317) 463-2502, Telex: 276143.

PERCOM Peripheral

Garland, Texas No. 4

WHETHER THE SS-50 BUS?

by Harold Mauch
President, Percom Data Company

This is issue number four of the Percom "Peripheral." This issue was planned for release a year ago. However, at that time and during the months that followed direction of the SS-50 bus market was unclear.

6809-based computers for the SS-50 bus have been introduced by several manufacturers but the market for SS-50 bus products has not expanded as fast as the market for Tandy, Apple and other personal computers.

TSC, Microware and others are developing good 6809 *systems* software but the more lucrative *applications* software such as Visicalc, Profile, Electric Pencil and Scripsit, which spur the sales of Tandy and Apple computers in the small business market, are virtually nonexistent.

CONTENTS

On the other hand, hardware variations of the SS-50 bus computer are much more easily implemented, and are more cost effective than variations of either the Tandy or the Apple computer.

Consequently, we feel the SS-50 bus computer is more adaptable to the needs of the experimenter-oriented computer hobbyist and to the systems designer configuring a control or specific application computing system.

With this conclusion in mind, Percom engineers have developed several SS-50 and SS-30 bus modules ranging from a six-shot motherboard to a color video display generator and a 48K dynamic memory card. Several of the new modules are described in this newletter as well as suggested system configurations.

If you are a computer experimenter, you will enjoy Wayne Smith's article on "Plywood Computers".

The number of LFD-400 mini-disk system Users Group Diskettes has grown to ten and now includes the source of the 6809 disk drivers, plus software to build a complete semi-intelligent terminal using our SBC/9 and ELECTRIC WINDOW video display cards.

Incidentally, you should keep an eye on Percom TRS-80 advertising. Many of the products featured are easily connected to SS-50 bus computers -- for example, SPEAK-2-ME-2, the SPEAK 'N SPELL adapter, and the ELECTRIC CRAYON color graphics generator. (Secret: The ELECTRIC CRAYON uses a 6802 to perform its magic!)

PLYWOOD PRODUCTS

by Wayne Smith

A few weeks back, I was complaining to our Marketing Manager about how the small computer industry as a whole had abandoned the experimenter and that there just wasn't a cheap way to get into micro computing anymore. He indignantly informed me, number one, that, "WE do not use the word "cheap". WE use the word "inexpensive," and, number two, if I thought things were bad now, I should wait until January 1st when the FCC rules on home computer EMI take effect. Well, January 1st has come and gone. The prices haven't made any dramatic swing up but they haven't come down, either. (So much for forecasts by our Marketing Manager.)

The objective of this article is to discuss some of the techniques I used to bring up my "inexpensive" personal system and some of the "inexpensive" systems developed for testing in the lab at Percom.

The first and most important problem I was faced with was how to start.

After hours (with calculator in hand) brainstorming, think-tanking, etc., and after throwing out the idea of making an aluminum enclosure out of old Dr. Pepper

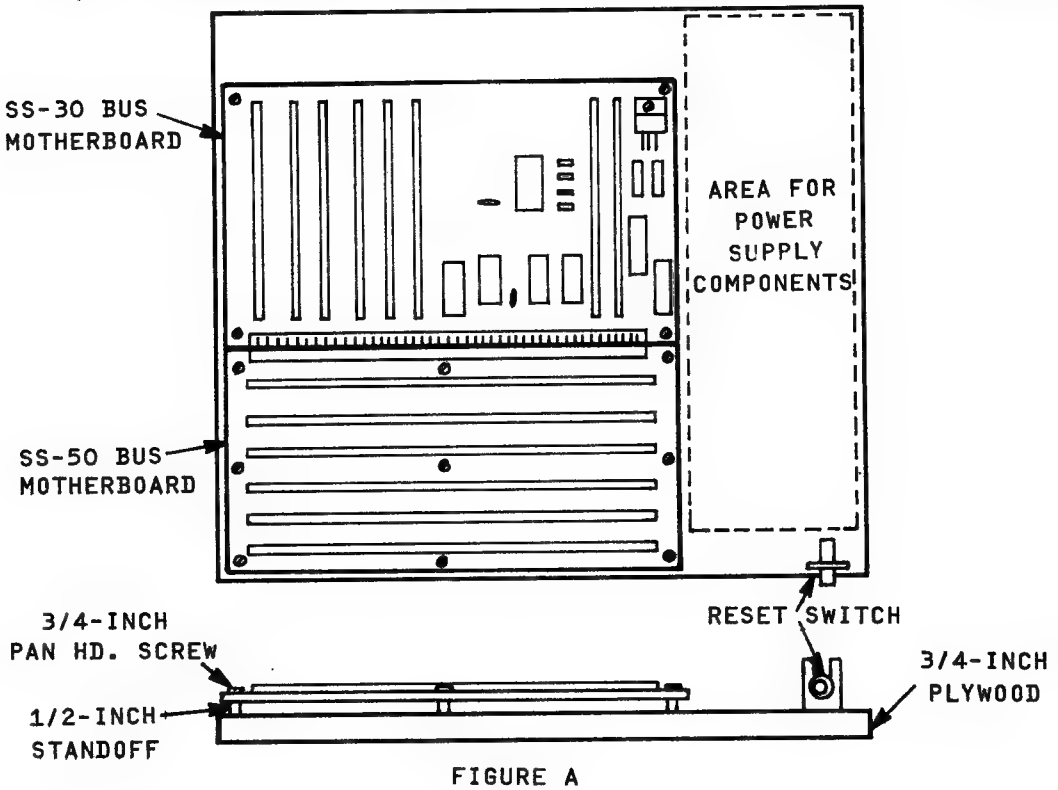


FIGURE A

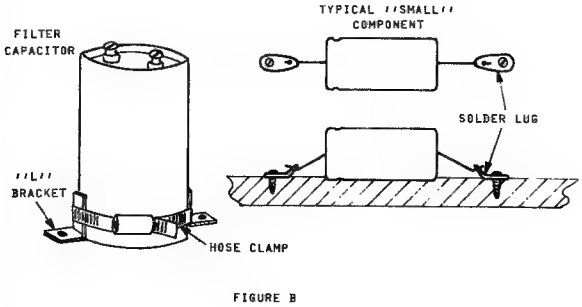
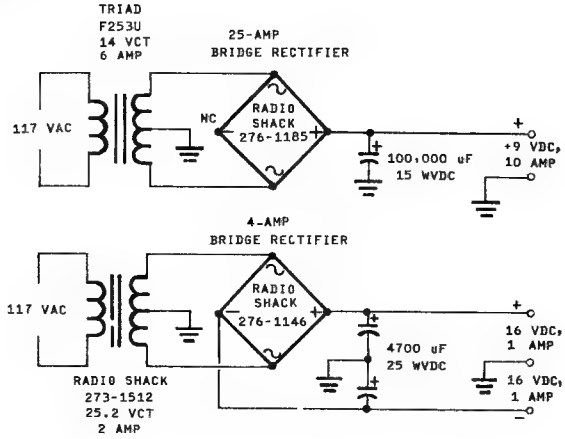


FIGURE B



cans, it dawned on me....plywood! Curiously, 3/4" x 16-1/8" x 15-1/4" was the ideal size. I felt very fortunate when the scrap I found in my garage turned out to have precisely those dimensions, so I didn't have to cut it! (The ideal size will vary from garage to garage.)

Figures A and B give a suggested layout, and installation methods for components. Hose clamps and "L" brackets are ideal for mounting large caps. Solder lugs screwed into the plywood base provide mechanically sound tie points, and, lest "WE" forget, inexpensive six-slot SS-50 motherboards and SS-30 motherboards are available from Percom. These units conveniently plug right into each other so that an SS-30 section can be added later -- or left off altogether -- depending upon system needs. Both SS-50 and SS-30 proto boards are available if you take a notion to learn the true meaning of "Built from Scratch".

A good power supply spec would be 10 A at -16 Vdc, unregulated. A schematic of a supply that meets these specifications is shown on page 2. Remember, you need 8,000 to 10,000 microfarads/amp on your supply to get no more than 0.5 ripple (all calculations +/-2 dB). Careful! If you use a surplus supply, check it out thoroughly or your "inexpensive" computer will turn into an expensive smoke generator.

Many variations of the "Plywood Computer" can be invented. My favorite is one where I do away with the motherboard altogether and plug two boards into each other. See Figure C. This can be a very powerful configuration! An SBC/9 (6802 version) and an ELECTRIC WINDOW instantly form a data terminal (with DB-25 interconnect). A parallel keyboard can be interfaced to the SBC/9 superport and a video monitor to the ELECTRIC WINDOW.

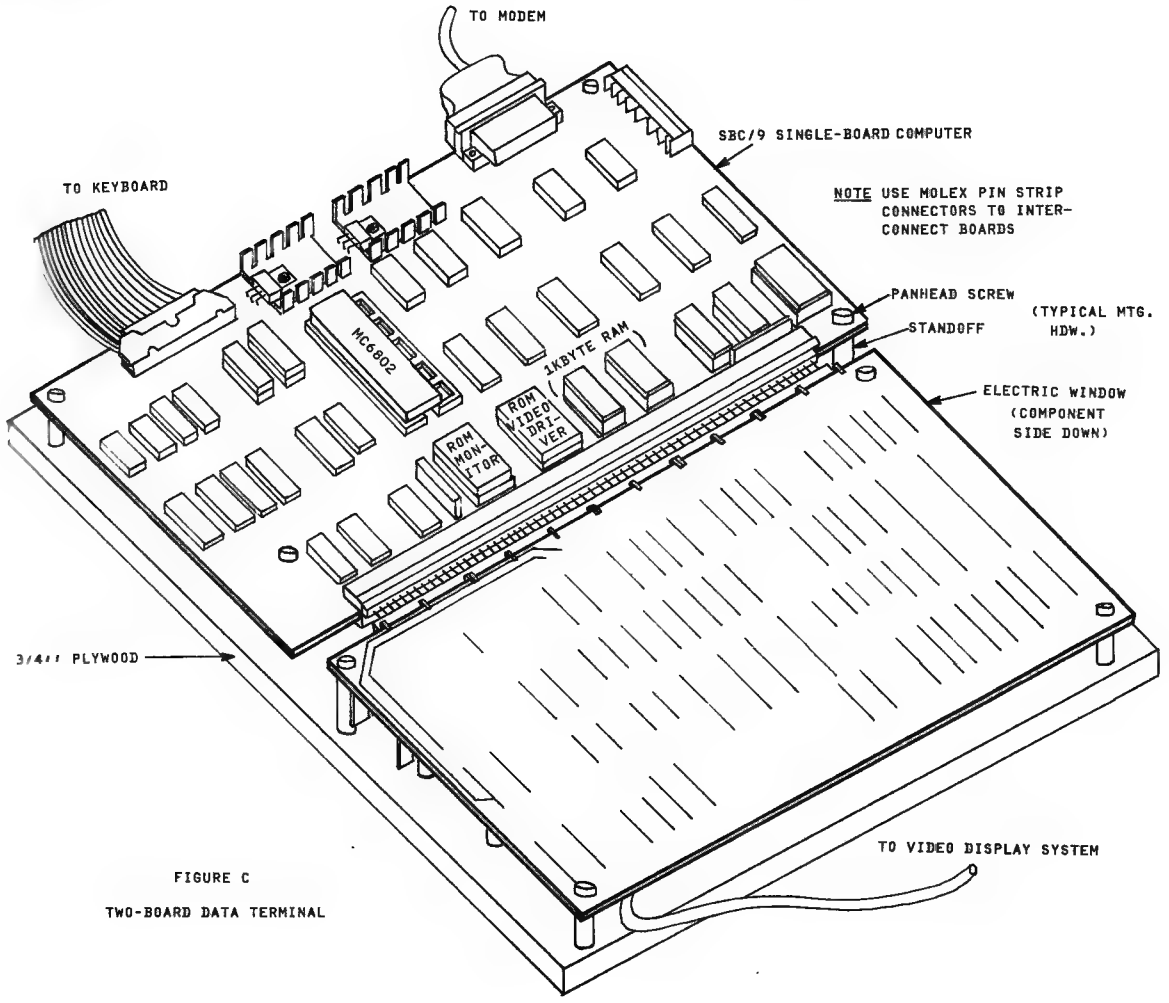


FIGURE C

TWO-BOARD DATA TERMINAL

Special purpose projects like this also limit the need for large power supplies. (SBC/9 + ELECTRIC WINDOW = 3 A at +10 V, 1 A at +15 V, 1 A at -15 V). This also could be done with our COLORAMA card to form an intelligent color graphics terminal.

Another system idea would be to mate the SBC/9 with the Percom 48K dynamic RAM card, forming a very compact system. Any boards used in this configuration could easily be reclaimed for other projects at any time.

I hate to say it, but the FCC will need equal time at this point. Unshielded micro's *do* have a tendency to radiate RFI. If you build a computer that makes your neighbor's TV go bananas, *you* are responsible for correcting the situation. Volumes have been written on the subject so if you run into trouble, consult your local library or Radio Amateur's Handbook.

BEYOND PLYWOOD

by Phil Sanders

The seed for Wayne Smith's cheap plywood project discussed elsewhere in this issue of the Peripheral was born of necessity as much as blue-skying. One day we came up short a data terminal, and the "instant" plywood terminal he mentions became an inexpensive semi-intelligent terminal that took the place of an ADM-3.

The inexpensive plywood terminal consists of an SBC/9 configured for a 6802, an ELECTRIC WINDOW, SS-50 bus connectors and an ELECTRIC WINDOW driver EPROM that plugs into the SBC/9 $F800 ROM socket.

The power of this system is that it can be configured, modified, or added to by changing the firmware. In other words, you can construct a terminal to satisy your needs through software.

```
   (F7FE)       ACIAS   EQU    $F7FE       SBC/9 ACIA STATUS PORT
   (F7FF)       ACIAD   EQU    ACIAS+1     SBC/9 ACIA DATA PORT
   (F7FC)       KEYPRT  EQU    $F7FC       SBC/9 PARALLEL PORT
   (F803)       DSPLAY  EQU    $F803       DISPLAY A CHAR ROUTINE

   (1000)               ORG    $1000
1000 86 03      MSTRST  LDA A  #$03
1002 B7 F7FE            STA A  ACIAS
1005 86 51              LDA A  #$51
1007 B7 F7FE            STA A  ACIAS
100A B6 F7FE    READY   LDA A  ACIAS       ACIAS RECEIVE READY?
100D 47                 ASR A
100E 24 08              BCC    KEYIN       IF NOT CHECK KEYBRD READY
1010 B6 F7FF            LDA A  ACIAD       GET CHAR
1013 BD F803            JSR    DSPLAY
1016 20 F2              BRA    READY       GET NEXT CHAR
1018 B6 F7FC    KEYIN   LDA A  KEYPRT      KYBRD RECEIVE READY?
101B 2A ED              BPL    READY       IF CHECK ACIA
101D 7D F7FC    KEYIN1  TST    KEYPRT      WAIT FOR END OF STROBE
1020 2B FB              BMI    KEYIN1
1022 43                 COM A              INVERT DATA FOR SBC/9 8835
1023 F6 F7FE    XMTRDY  LDA B  ACIAS       ACIA READY FOR XMIT
1026 57                 ASR B
1027 57                 ASR B              CHECK BIT 1
1028 24 F9              BCC    XMTRDY      WAIT UNTIL XMIT READY
102A B7 F7FF            STA A  ACIAD       OUTPUT CHAR TO TESTEE
102D 20 DB              BRA    READY

   (FBD4)               ORG    $FBD4
FBD4 14                 FCB    $14 CONTROL T
FBD5 10 00              FDB    MSTRST
     00  ERROR(S) DETECTED
```

For example, our drive allows us to change the video format from 24 x 80 interlace to 24 x 64 interlace or 16 x 64 non-interlace with a couple of key strokes. This video driver and others are available on LFD-400 Users Group Diskette UGD-6. On page four is the routine that configures the inexpensive plywood terminal as stand-alone, semi-intelligent data terminal.

TERMINAL COMMANDS

Configures the system so it will communicate with outside systems. Characters input by the keyboard through the parallel port are routed to an outside system by the ACIA. Consequently, the keyboard talks (gives commands, data, etc.) to an outside system. Input from the ACIA is routed to the SBC/02 (SBC/9 with 6802) input character routine, letting the outside system also talk to SBC/02. This is the basis for configuring the SBC/02 and ELECTRIC WINDOW as a terminal.

INDEX...TRY IT. YOU'LL LIKE IT!

By Phil Sanders

Despite the recent hoopla and rash of 6809 advertising, you don't have to discard your 6800 processor and 6800 programs to have a powerful and sophisticated disk operating system. Instead, upgrade to INDEX (INterrupt Driven EXecutive).

INDEX is the most powerful disk operating and file manager system available for the 6800 microprocessor. INDEX was modeled after the disk operating systems of a DEC computer and has many UNIX features.

INDEX, being interrupt driven, is a real-time operating system in which your processor will not have to waste processing time sitting in a software loop; data flow and program execution will also be increased.

INDEX is file and I/? device independent and allows limited pipe-lining. Data transfer I/O is the same regardless of the device type; INDEX doesn't know the difference between a disk file and a printer, and it doesn't matter. Thus, devices may be added without modifying the operating system.

All file control is handled internally by INDEX. Consequently, INDEX will automatically close all open files and thereby prevent disk crashes.

Type-ahead is permitted by buffered I/O to external devices. As you type in the current line, the previous line is simultaneously being processed.

Also there is a multi-level directory and many other 'big' computer features.

INDEX is supported by editors, assemblers, compilers, and Percom Super BASIC. Plus, Percom continues its INDEX upgrade policy in which LFD-400 users can upgrade their MPX programs to INDEX for a nominal fee. And a special added attraction: The INDEX Advance Programmers Guide (Use INDEX to its maximum power while learning advanced programming techniques) has been reduced to $29.95.

Don't throw away your present processor and investment for a new and expensive disk operating system when much of the same power is available with INDEX. And much, much cheaper. Quit the rat race. Try INDEX, you'll like it.

6809 SOFTWARE

By Tim McKee

The MPX/9 DOS and PSYMON Monitor

We have developed a disk operating system for use with our 6809 PSYMON operating system that is quite different from its 6800 predecessor. It is called MPX/9, and is available off-the-shelf.

MPX/9 consists of two pieces, a ROM to be placed in the LFD400 card and a diskette containing the actual disk operating system. The ROM contains the Read-Sector and Write-Sector routines, and a routine that will read the contents of track 0 sector 0 into memory and execute it. Sector 0 on track 0 contains a "boot" that will control the loading of the actual disk operating system. The book that we supply will start searching for the highest 4K block of memory, below the address of the disk controller card, and proceed to load MPX/9 into that memory. The boot will then transfer control to MPX/9.

This structure presents a dilemma to assembly language programmers who are used to performing a "JSR" to a routine in the DOS: the programmer wouldn't know from one system to the next where the highest 4K of memory would be located! We structured this software so that the user *never* needs to know where MPX/9 is

located. All operating system software calls are made by executing an "SW13" instruction followed by a one-byte number signifying what operation you desire.

MPX/9 links directly to PSYMON. In fact, it *requires* PSYMON to operate. PSYMON is a 1Kbyte OS for the 6809. While it provides the usual monitor commands and breakpoint management PSYMON's true power is in its structure and extensibility. PSYMON may be tailored for nearly any configuration. This is done using a unique "look-ahead" feature and a Device Control Block (DCB). The "look-ahead" feature allows a user-written routine to alter pointers used by PSYMON. The DCB allows PSYMON to be nearly I/0 device independent by leaving details of the I/0 to the specific I/0 device driver. The Device Control Block (DCB) structure of PSYMON is expanded by commands that will search the DCB list for a specific DCB, delete a DCB from the linked list of DBCs, and add a DCB to the linked list of DCBs. Some very good examples of this are found on UGD-9, an LFD-400 User Group Diskette, in the source file for the LIST utility.

MPX/9 allows the user to open and close files by filename, to perform sector-by-sector Read/Write to the disk, and to perform character-stream I/0 to the disk.

The following is a complete list of MPX/9 system calls

0) Return to PSYMON monitor.
1) Execute I/0 request.
2) Output character to console.
3) Input character from console.
4) Print string on console.
5) Get HEX number from console.
6) Print 4-digit number in hex.
7) Print 2-digit number in hex.
8) Return to MPX/9.
9) Get a line of input from terminal.
10) Skip spaces in line of text.
11) Go to next word in line of text.
12) Process text line as MPX/9 command.
13) Report error to console.
14) Locate a file.
15) Locate a free space on disk for file.
16) Read a disk directory.
18) Initialize a File Control Block.
19) Open a file.
20) Close a file.
21) Read a character from a file.
22) Write a character to a file.
23) Read a sector from a file.
24) Write a sector to a file.
25) Load a memory segment.
26) Save a memory segment.
27) Compare two ASCII strings.
28) Move a block of memory.
29) Get a decimal number from text string.
30) Get a hex number from text string.
31) Print decimal number and space.
32) Delete a file.
33) Locate a DCB.
34) Add a DCB.
35) Delete a DCB.

6809 Super BASIC

Super BASIC is available to run on the 6809 with MPX/9. It is faster and has several additions (see patches elsewhere in this issue of the Peripheral). And -- good news -- the price of Super BASIC is now only $29.95.

FLEX/9 Overlays

We also have overlays that will convert FLEX 9.0 software to operate on a Percom LFD-400 mini-disk system. This software, called FLEXTRAN/9, requires two drives, and 8K of memory at $C000. This mapping necessitates relocating your LFD-400 controller to the $E000 range. Complete instructions are supplied with the software. (FLEX 9.0 must be purchased from TSC or a TSC distributor.)

NEW PRODUCTS

We've introduced a number of new SS-50 bus products since the last issue of the Peripheral. Thumbnail descriptions of the principal ones are set forth below. These briefs were prepared by Dale French of our technical staff.

M24SS Static RAM Card: A 24-Kbyte static RAM board organized into three independent 8-Kbyte blocks. Works with either the standard SS-50 or the 1;Mbyte extended addressing bus. Comes assembled, burned-in and tested. Users manual includes source listing of diagnostic memory test. Also available in 8- and 16-Kbyte configurations.

M48DSS Dynamic RAM Card: A low power 48-Kbyte dynamic RAM board organized into three independent 16-Kbyte blocks. Works with either the standard SS-50 bus or the 1-Mbyte extended addressing bus.

Comes assembled, burned-in and tested. Users manual includes source listing of diagnostic memory test. Also available in 16- and 32-Kbyte versions.

ColoRAMa-50: A memory-mapped *color* VDG board. Generates alphanumerics, semi-graphic displays. Full graphic resolutions range from 64 x 64 pixels to 256 x 192 pixels. Displays in two, four or eight colors, depending on the display resolution. Two- and four-color displays may be complemented. Board is designed to accommodate a low cost Radio Shack modulator for TV set display. Comes with one Kbyte of display RAM which provides for alphanumeric, semigraphics and two low-density full graphic display formats. Also provides for 2-Kbyte EPROM. Cassette I/0 provides for low-cost file storage. Users manual includes source listing of display OS. works with 1-Mbyte extended addressing bus. The ColoRAMa-50 occupies an 8-Kbyte block of memory in the upper half of a 64-Kbyte address space. Board accommodates additional RAM for higher density display modes.

The COLOR CONNECTION: A cable/circuit card assembly which is used to adapt the 6809-based TRS-80 Color Computer to the SS-50 bus. The COLOR CONNECTION allows access to LFD-400 mini-disk storage, RAM expansion, interfacing (via the ELECTRIC WINDOW,e.g.) to a word-processing quality BW display system, etc.

SS-50 Bus Motherboard: A seven-slot system bus card that can also be used as an extender card for servicing function cards.

SS-50 Bus Motherboard Kit: Accommodates up to eight 30-pin I/0 cards. Supplied complete with PC board connectors and components required for application as an I/0 extension motherboard for the SS-50 bus.

Since the last Peripheral was issued, many new 680X programs have been released. Two new 6809 releases, mentioned elsewhere in this issue of the Peripheral, are MPX/9, a 6809 DOS for our LFD disk systems, and a 6809 version of Percom Super BASIC.

To place an order or request product literature, call our toll-free order number, 1-800-527-1592. For additional technical information call (214) 272-3421.

LFD-400 Users Group

To permit all LFD-400 users an information exchange forum, we have formed an LFD-400 Users Group. This newsletter will be used to inform users of contributed programs and suggestions. However, software will be distributed on diskette for a nominal charge to cover cost of reproduction and distribution.

NOTE: User Group Diskettes #1, #2 and #3 were described in the last issue of the Peripheral.

LFD-400 UGD #4

This diskette is dedicated to Motorola's Micro Chroma 68 and its TVBUG monitor. Included are over a dozen video displays and several source listings from the Percom ELECTRIC CRAYON to use as driver examples. System Requirements:

Micro Chroma 68 with TVBUG
LFD-400EX (at least one drive)
7K of RAM at $0000

LFD-400 UGD #5

HEXLD1: Hex loader with offset. Source and object files.
BASEDT: Links Peter Stark's BASIC Editor from Jan. '79 Kilobaud to MPX. Source and object files. Submitted by Doug Beck.
OTHELO: A game in Percom Super BASIC. Submitted by Doug Beck.

TTT$: Tick-Tac-Toe in Strubal. Submitted by Doug Beck.

ALIGN: Program for drive alignment. Source and object files. Submitted by W. A. Arrera.

HEXLD2: Hes loader with offset. Source and object files. Submitted by W. A. Arrera.
LIST Print program with universal print driver. Source and object files. Submited by K. J. Kroeker.
HEXLD3: Hex loader with offset. Source and object files. Submitted by Val Walker.
PRMLDR: Hex loader with offset for Index. Source, object, and Help files. Submitted by Joe Sasser.

CONCAT: Program to copy and concatenate files. Source and object files. Submitted by Rex Klopfenstein, Jr.
DINDEX: Master file directory in alphabetical order. Use with Percom Super BASIC. Source and object files. Submitted by Peter Stark.
GRAPHC: Controller for the SWTPC GT 6144 Graphics Terminal. Object and Help files. Submitted by Donald Taylor.

LFD-400 UGD #6

New diskette January 1981

VIDEO+: Deluxe 6800 video driver for 64 x 16 memory mapped video board; includes changes to MICROBUG monitor to allow it to be used with VIDEO+. Submitted by Gary Calvert.
VIDEO9: 6809 video driver for a 64 x 16 memory mapped video board and PSYMON operating system. This listing does not requite a 6809 assembler as Gary used an interesting technique to produce 6809 op-codes on a 6800 assembler. Submitted by Gary Calvert.
SWTPAT: Patch and other tips to modify SWTBUG monitor for operation with WINDEX. Submitted by Tim McKee.
VIDRVR: Deluxe video driver for the ELECTRIC WINDOW. Submitted by Phil Sanders.
MISCEL: Two commands that may be added to VIDRVR; one permits the ELECTRIC WINDOW and SBC/9 configured for 6802 to communicate with another system, the other configures VIDRVR for a 'typewriter' mode.

LFD-400 UGD #7

This diskette contains the source files for the MPX/9 disk operating system and the 6809 disk driver ROM. These source files are on a 6800-compatible disk and may be edited, assembled, etc. with existing 6800 software, or they may be converted to 6809 format with your system REMAP utility. (See UGD #8).

LFD-400 UGD #8

This diskette contains the source files for the MPX/9 disk boot, the REMAP utility and the COPY utility. These source files are in 6800 format, same as UGD #7.

LFD-400 UGD #9

This diskette contains the source files for UGD #10 in 6800 format same as UGD #7.

LFD-400 UGD #10

MPX/9 utility system diskette. Contains the following utilities:

Serial Line Printer driver
Vector output to any device
Print formatted directory
List a file
Load a hex (S1-S9) file with offset
Execute commands from a text file
Disk sector editor
Certify a diskette
Create a text file
Verify the readability of a diskette
Memory test

Ed. Note

A supplement to this issue of the Peripheral is available from Percom Data Company. The supplement includes more specific information -- for example, notes on product improvement and maintenance -- and a 'short-form' product price list. This supplement, which is automatically mailed to subscribers of the Peripheral, may be obtained from Percom by calling our toll-free order number, 1-800-527-1592. From within Texas, call (214) 272-3421.

TRADEMARKS APPEARING IN THIS ISSUE OF THE PERIPHERAL:

Percom Data Company, Inc.: ColoRAMa-50, the COLOR CONNECTION, ELECTRIC CRAYON, ELECTRIC WINDOW, EXDOS, INDEX, LFD-400, LFD-800, ModulEX, MPX /9, PSYMON and SBC/0.

Blue Hat Software Company: DIXIE

Motorola Corp.: EXBUG, EXORciser, MICROBUG, MICRO CHROMA, MIKBUGand MINIBUG.

Star-Kits Company: HUMBUG

Tandy Radio Shack Corp.: TRS-80

Technical Systems Consultants, Inc.: FLEX

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Extended Basic Interpreter	DM 200,00
6800 Debug Package	DM 90,00
6809 Debug Package	DM 150,00
Basic Precompiler	DM 80,00
Extended Basic Precompiler	DM 100,00
Sort/Merge Package	DM 150,00
6800 FLEX Utilities	DM 200,00
6809 FLEX Utilities	DM 120,00
6809 Diagnostics Package	DM 150,00
Text Processing System	DM 120,00
68000 Cross Assembler	DM 500,00

UCSD Pascal

CSI-1	Betriebssystem, Pascal Compiler, Editor	DM 500,00
CSI-2	Basic Compiler, L-2 Editor, Disassembler	DM 200,00
CSI-3	Macro Assembler für 6800 und 6809	DM 200,00
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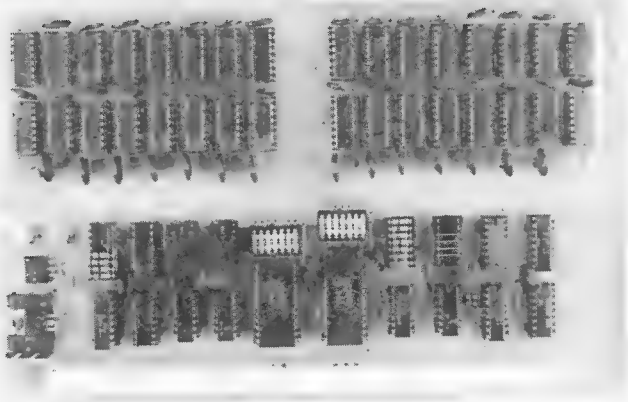

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*Asm. & tested, with extra features $395.00
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*Decoded for extended addressing *6800, 6802, 6809 compatible *6-4K blocks individually addressable 0-F *Low power consumption (typ. 3 amps) *Add memory 1K at a time using low cost 2114L's ($5.00 ea) *Gold edge connectors
A/T with 16K $325.00; with 8K $225.00; with 1K $150.00

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*Perfect for the user who wishes to design his own special interface, but doesn't want the bother of decoding and interfacing to the processor buss. Three PIA's, four ACIA's, and one PTM (3-6821, 4-6850, 1-6840) are already buffered and decoded. Three TO-220 regulators (+5, +12, -12) *Pad spacing permits the use of most standard sockets from 8 to 64 pins *Accommodates a mix of 38 14 & 16 pin sockets

A/T $95.00 ***** TRANSITION CARD ***** B/C $49.00

*A component part of Thomas Instrumentation's Backplane System *Contains all the necessary hardware to interface 8 SS-30 slots to one SS-50 slot *Contains all the logic necessary for use with a 6800 or 6809 system *Provisions for optional (not supplied) on-board baud rate generator and slow memory have been made

A/T $95.00 ***** CASSETTE INTERFACE CARD ***** B/C $49.00

*Plugs into Thomas Instrumentation's CPU Card *Uses circuitry licensed from and compatible with the JPC High Speed interface *Includes dual relays for motor control
Software drivers on cassette $25.00 Software drivers in EPROM $35.00

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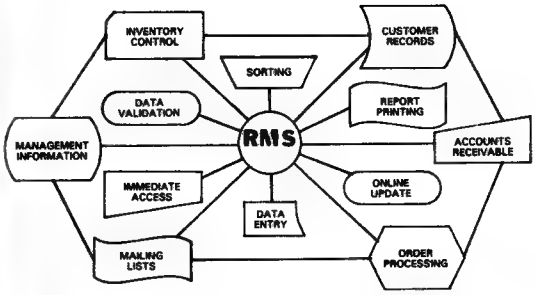

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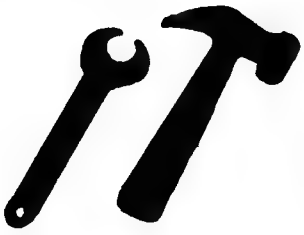

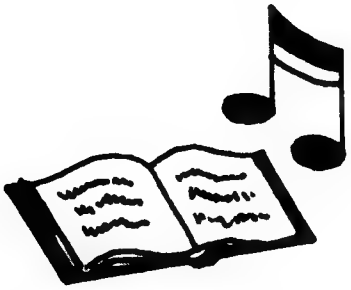

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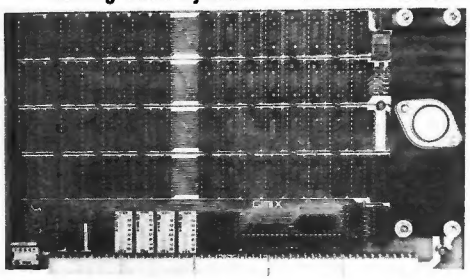

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